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Uncertainty in below-ground carbon biomass for major land covers in Southeast Asia

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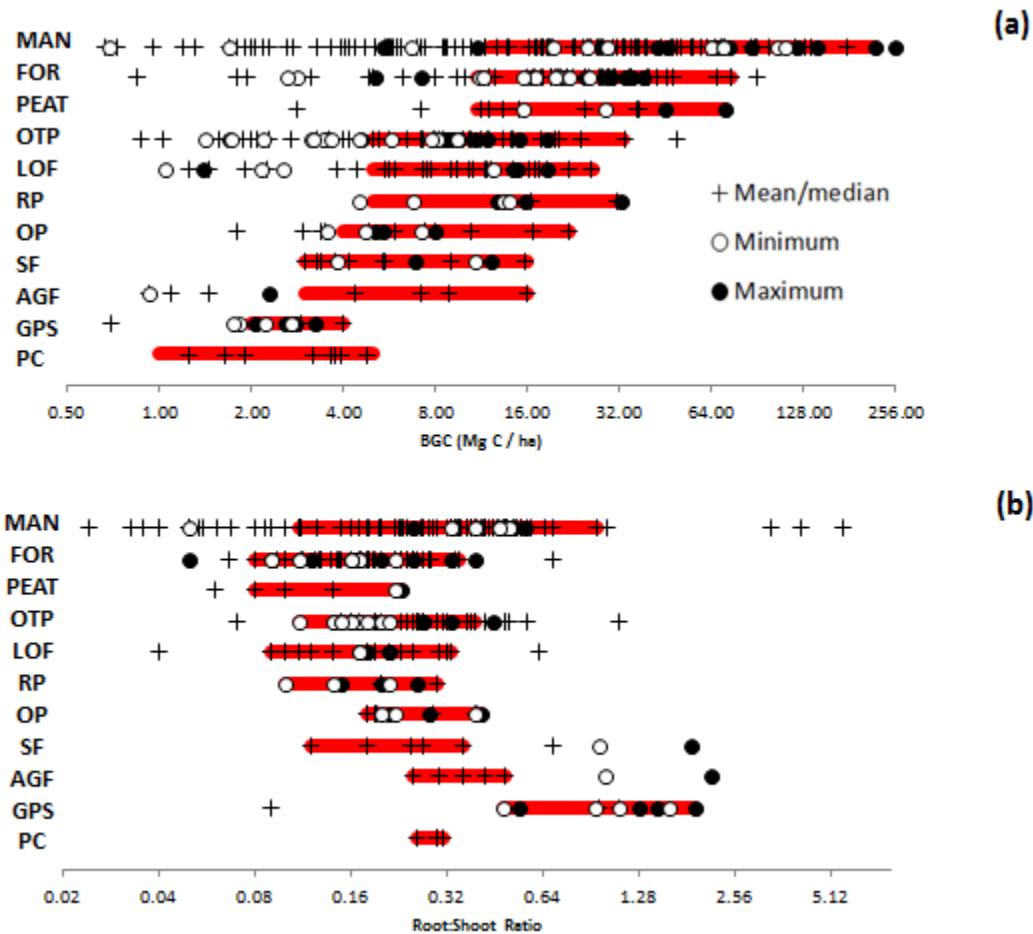


Figure 1. (A) Summary of root carbon biomass values derived from the review studies/papers (Table S1, values < 0.5 Mg ha⁻¹ excluded). (B) Summary of reported and derived root: shoot ratios (Table S1; values < 0.02 excluded). The eleven land-covers considered are: mangrove (MAN); forest (FOR), peat forest (PEAT), orchard and tree-plantation (OTP), logged over forest (LOF), rubber plantation (RP), oil palm plantation (OP), swidden fallows of any length (SF), non-swidden agroforest (AGF), grassland, pasture or shrub land (GPS) and permanent cropland (PC). The thick line indicates an adjusted range of values after the removal of outlying values that may not be representative of the land cover class in general.

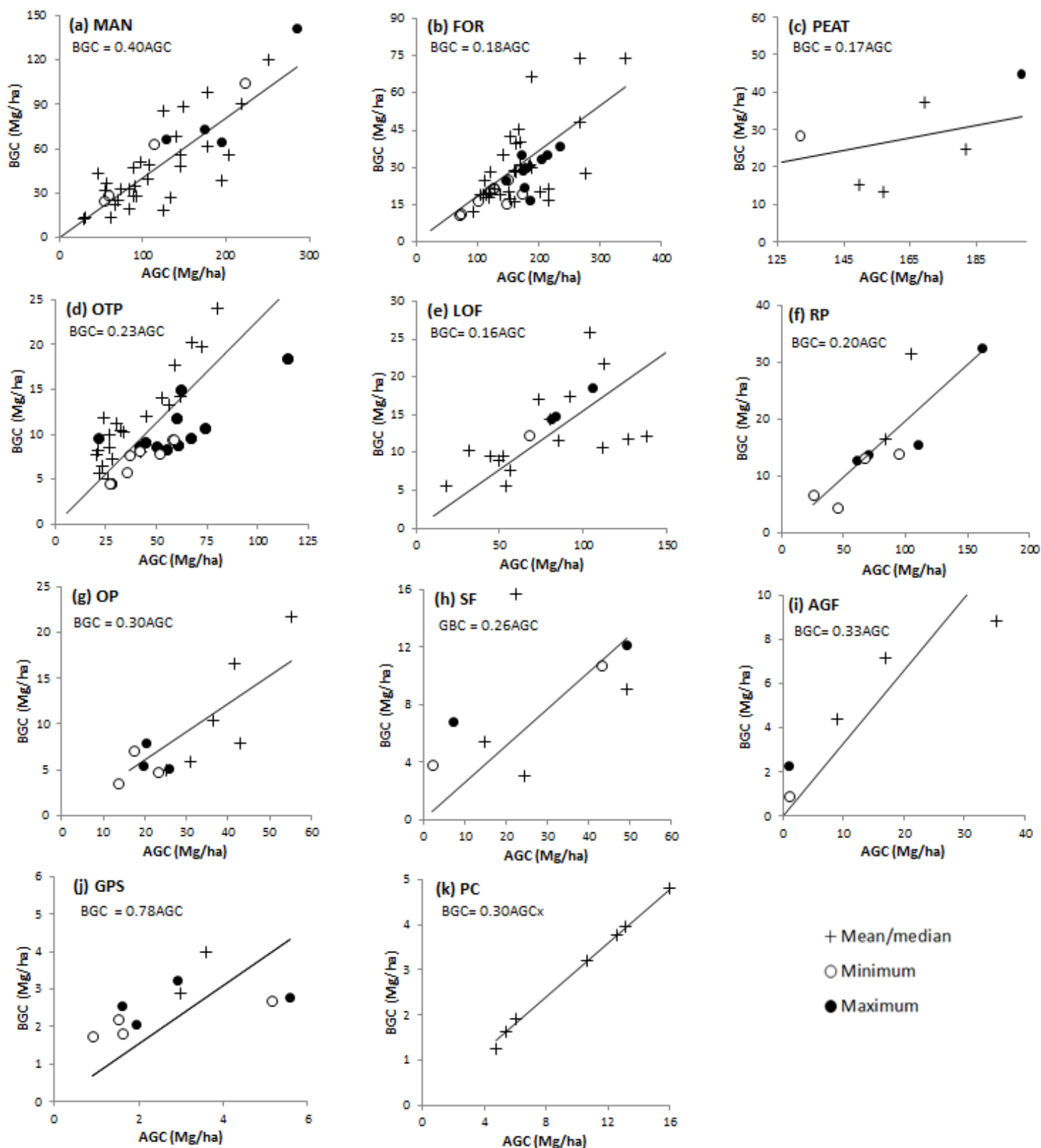


Figure 2. Plots of above-ground carbon biomass (AGC) versus below-ground carbon biomass (BGC), derived from the biomass data reviewed in this study for 11 land covers in 12 SE Asian countries. The fitted lines represent an estimate of the root:shoot ratio (RSR) for each land-cover (reported in Table 3). The data are only those from the adjusted ranges. The eleven land covers considered are: mangrove (MAN); forest (FOR), peat forest (PF), orchard and tree-plantation (OTP), logged over forest (LOF), rubber plantation (RP), oil palm plantation (OP), swidden fallows of any length (SF), non-swidden agroforest (AGF), grassland, pasture or shrub land (GPS) and permanent cropland (PC).

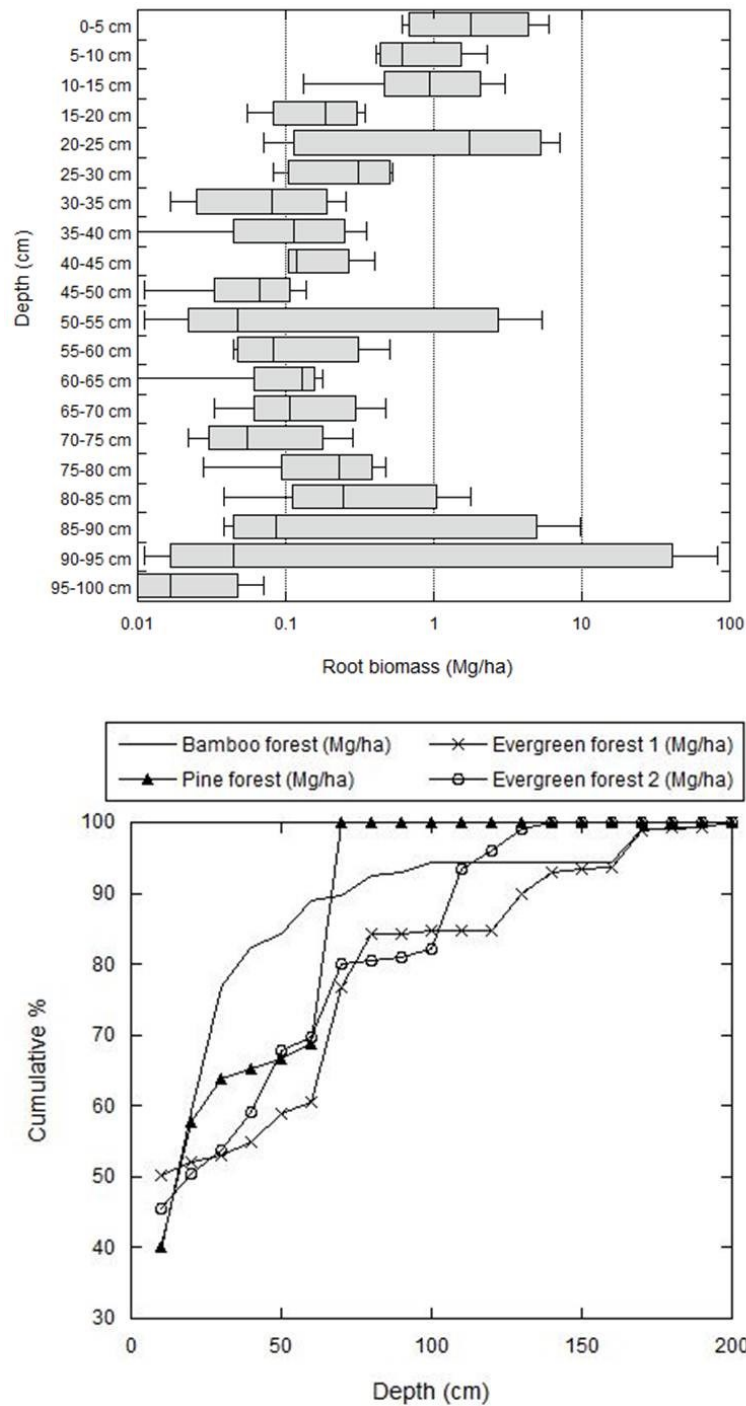


Figure 3. (a) Variation in root biomass with depth in a secondary forest in northern Thailand; (b) Comparison of cumulative percentage of total root biomass in the upper 2m of soil in three different forest types in northern Thailand; note how that replicates in different soil pits of the evergreen forest show very different results. These data are based on a demonstration study at the Pong Khrai Royal Forest Department Research station, located in Mae Sa Catchment, Chiang Mai, Thailand (18°54 N and 098°48E). In July 2013, we excavated tree roots from alive, newly toppled trees. Within a 50 x 50 m plot in a dry secondary evergreen forest, roots were extracted in several locations via augering vertically in 15 cm increments to a depth of 1 m. The 15-cm core was separated into three 5-cm sub-cores (internal diameter 4.8 cm). In addition, 2-m soil pits were excavated by hand in evergreen (n = 2), pine, and bamboo-dominated forests. Soil samples were then collected with a 5-cm core, at 10-cm increments down to 2 m. Roots were then separated from the soils by manual sorting, followed by washing and oven drying at 65°C for 24 hours. Finally, the masses of coarse (> 2 mm) and fines (<2 mm) were determined.